SUPERFUND RESPONSE ACTION PRIORITY PANEL REVIEW FORM

Date Form Completed: 10/22/2013

General Site Information

Region:	7	City:	Fredericktown	State:	MO
CERCLIS EPA ID:	MOD098633415		CERCLIS Site Name:	Madison County Mines	
NPL Status: (P/F/D)	Final (F)		Year Listed to NPL:	2003	

Brief Site Description: *(Site Type, Current and Future Land Use, General Site Contaminant and Media Info, Site Area and Location information.)*

The Madison County Mines is a mine, processing and smelter waste site for contamination resulting from over two centuries of heavy metals mining at the Old Lead Belt in SE Missouri approximately 80 miles south of St. Louis. Over 850 acres of uncontrolled mine waste is present in 13 locations across the site. Natural, human and air transport has resulted in contamination of soil, sediment, surface water and groundwater throughout most of Madison and southern St. Francois County. Lead was the primary metal mined and is the predominant contaminant; a host of other geologically associated metals are present including cadmium and cobalt. Madison County is a rural community with light industry and agriculture; future land use is projected to remain unchanged. Residential properties includes residential yards, child high-use and public areas have been affected. Contamination from erosion has occurred in the receiving water courses and their associated systems. Mine waste has been used for driveways, road base and surfaces, construction grading and de-icing. Contaminated soil from floodplains along receiving water courses has been collected and transported for use as fill and topsoil at residential properties. Approximately 42% of all residential properties tested have exceeded the established PRG of 400 ppm lead. Three respositories have been used for all past response actions.

Type of Action:	Remedial	Site Charging SSID:	07LT
Operable Unit:	OU3 & OU4	CERCLIS Action RAT Code:	

Is this the final action for the site that will result in a site construction completion?	Yes	x No
Will implementation of this action result in the Environmental Indicator for Human Exposure being brought under control?	Yes	x No

Response Action Summary

Describe briefly site activities conducted in the past or currently underway:

Seven OUs have been designated for the site. Site-wide remedial investigations and risk assessments have been conducted covering the majority of the site. PRPs for OUs 1 & 2 are being pursued. Much of OU6 is on U.S. Forest Service property where an IA will be pursued for future response actions. RA has been initiated exclusively at OU3-Residential Properties which includes residences, child high-use and public properties under an Interim ROD. RODs have also been declared for OU4 Conrad Tailings and OU5 Catherine Mines and Skaggs Tailings with RA starts pending.

Approximately 1693 residential properties have been remediated using a combination of removal actions (813 properties) and remedial actions (880 properties). Approximately 550 properties remain to be sampled under OU3 with an estimated 300 properties remaining to be remediated.

OU4 Conrad Tailings is currently used as the site repository for the OU3 RA. Moderate grading to prevent erosion and maintain the disposed residential property soils during the RA for OU3 is ongoing. Non-engineered drainages and sediment basins have been constructed to prevent tailings and soil runoff to the associated water courses and nearby residences.

Specifically identify the discrete activities and site areas to be considered by this panel evaluation:

The focus of this review is OU3-Residential Soils (OU3) and OU4-Conrad Tailings (OU4). Funding is requested for joint actions to complete the RA for both since OU4 is the site repository for the OU3 soils.

The residential cleanup under OU3, which includes all residences, child high use and public areas, is ~80% complete. An estimated 300 properties remain to be remediated for properties known or suspected to possess contamination in excess of 400 ppm lead. Funding will also accommodate final development and implementation of the IC components of the selected remedy which includes health education and implementation of a voluntary institutional control pilot project (VICPP) because Madison County has limited taxation and enforcement capability that precludes the regulatory oversight that would prevent recontamination or new contamination at the residential properties.

The OU4 Conrad Tailings is approximately 28 acres in size and is being used as the site repository for the residential property RA. R7 is proposing that the tailings impoundment at OU4 be addressed in conjunction with the completion of the OU3 RA construction. For this action, tailings and soil around the perimeter, sediment and tailings in the creek, and tailings, sediment and soil in overbank and floodplain areas will be excavated and co-located at the repository. The repository will be covered with a soil barrier and a semi-permeable cap will be constructed at the surface. Engineered drainage will be constructed at and around the pile; engineered containment basins will also be constructed to control groundwater seeps. Existing wetlands and the potential establishment of new wetlands will be utilized to decrease runoff velocity and create riparian water barriers in heavily vegetated area that would otherwise require removal of forested areas to access and remove tailings and sediment. Wetlands, both existing and possibly newly established, will also serve for assisting in treating seeps. Monitor wells will be drilled at the repository and in down-gradient locations to monitor groundwater quality and characteristics; surface water will be monitored to ensure the effectiveness of the remedy.

Briefly describe additional work remaining at the site for construction completion after completion of discrete activities being ranked:

Under OU3, both health education and the VICPP will be continued. The VICPP will be evaluated for its effectiveness as a stand-alone IC component; if it fails, additional IC's (i.e. environmental covenants at individual residential properties under the Missouri Environmental Covenants Act) will be considered. Indicators to measure this will include routine blood-lead monitoring and sampling of remediated properties. The State has accepted the responsibility for O&M after construction completion.

Under OU4, groundwater and surface water monitoring will continue for approximately five years after construction to confirm the effectiveness of the discrete activities performed under this ranking. The State will perform O&M to ensure land use and activities are not compromising the effectiveness of the completed remedy; necessary repairs will be made as needed. The State has accepted O&M responsibilities five years after construction completion.

The site is subject to statutory Five Year Reviews for continued evaluation of protectiveness of the remedy.

Response Action Cost

Total Cost of Proposed Response Action:

($ amount should represent total funding need for new RA funding from national allowance above and beyond those funds anticipated to be utilized through special accounts or State Superfund Contracts.)

Exemption 5: DP

Source of Proposed Response Action Cost Amount:

(ROD, 30%, 60%, 90% RD, Contract Bid, USACE estimate, etc…)

OU3 - Exemption 5: DP . Current expenditure under the RA is approximately $17 M. The cost of past actions is extremely accurate and is incorporated in the OU3 future cost projections.

OU4 – Estimate of $9.5 M is a ROD estimate. This cost was confirmed based on post-ROD pre-design assessment estimates. The State provided the final design under a Cost Share Cooperative Agreement under OU3. Since OU3 RA completion remains pending, there is an expectation that specifications will be modified during construction and incorporated, to some degree, as a "design as build" process since the exact amount of soil to be disposed of at the repository in the future is not precisely known.

Breakout of Total Action Cost Planned Annual Need by Fiscal Year:

(If the estimated cost of the response action exceeds $10 million, please provide multiple funding scenarios for fiscal year needs; general planned annual need scenario, maximum funding scenario, and minimum funding scenario.)

Exemption 5: DP

Other information or assumptions associated with cost estimates?

Provisions are included in the OU4 design to accommodate the remaining disposal of OU3 residential soil at the repository. As previously stated, some "design as build" provisions will be incorporated with the OU3 and OU4 RAs progressing simultaneously.

Readiness Criteria

1. Date State Superfund Contract or State Cooperative Agreement will be signed (Month)?

OU3 SSC was signed in 2008; OU4 SSC will be completed by Dec 2013

2. If Non-Time Critical, is State cost sharing (provide details)?

State cost share 10% of Remedial Action expenditures

3. If Remedial Action, when will Remedial Design be 95% complete?

Completed in 2012

4. When will Region be able to obligate money to the site?

June 2014

5. Estimate when on-site construction activities will begin:

Aug 2014

6. Has CERCLIS been updated to consistently reflect project cost/readiness information?

Yes

Site/Project Name:	**Madison County Mines / OU3 Residential Soils & OU4 Conrad Tailings**

Criteria #1 - RISKS TO HUMAN POPULATION EXPOSED (Weight Factor = 5)

Describe the exposure scenario(s) driving the risk and remedy. Include risk and exposure information on current/future use, on-site/off-site, media, exposure route, and receptors:

OU3 - Contamination at residential properties presents an imminent risk to human health at residential properties, particularly to young children up to 7 yrs in age as observed through historic blood-lead monitoring conducted since the late 1990's. Blood-lead monitoring revealed over 13% of the target child population with elevated blood-lead at the start of the response actions, to less than 2% with the residential cleanup at 80% complete which confirms the success of reducing blood-lead in children.

OU4 – The use of on-site mine waste materials and soils for construction and grading has historically occurred resulting in a high risk of exposure both at on- and off-site locations (i.e. residential properties presented as described above). Recreational use of the waste pile and continued downstream deposition through erosion could result in additional potential exposure to humans. EPA's use of the tailings pile for a repository also imposes an inherent obligation for EPA to complete the RA since additional contamination could result if the tailings impoundment is not properly engineered, constructed and completed.

Estimate the number of people reasonably anticipated to be exposed in the absence of any future EPA action for each medium for the following time frames:

MEDIUM	<2yrs	<10yrs	>10yrs
Mine Waste	15	25	40
Soil/Sediment	850	875	900
Surface Water	50	50	50
Groundwater	6	10	20

Discuss the likelihood that the above exposures will occur:

Likelihood for exposure at residential properties that are not remediated is imminent (likely approaching 100%) as proven from past sampling of blood-lead in children at contaminated properties. Additionally, four residences are located within 3/8 mile of the tailings impoundment which are to be remediated prior to the completion of the OU4 RA. Additional residential construction is planned by property owners adjacent to the OU4 project which is located in a convenient proximity to the City of Fredericktown but in a quiet, rural setting with forest and abundance of wildlife. Exposure to tailings and soils could result from the continued practice in the area of using the material for residential fill and grading (similar to the contamination that resulted at residential properties), however the current owners have agreed to prevent development in the repository area after it is constructed. Surface water, soil, and sediment downstream presents exposure risks from recreational activities including child play, hiking, and fishing. Groundwater exposure is considered least likely as significant or widespread groundwater contamination has not been detected across the site, only in isolated private wells. However, groundwater controls through the Missouri Environmental Covenants Act (MoECA) will prevent well drilling at and around the repository to reduce exposure potential.

Other Risk/Exposure Information?

On- and off-site exposure to ecological systems has and continues to occur with impacts to both terrestrial and aquatic life presenting exposure risks to humans from consumption.

Site/Project Name:	Madison County Mines – OU3 Residential Soils & OU4 Conrad Tailings

Criteria #2 – SITE/CONTAMINANT STABILITY (Weight Factor = 5)

Describe the means/likelihood that contamination could impact other areas/media given current containment:

OU3 lead-contaminated soil at un-remediated residential properties remains an ongoing source of exposure from windblown dust through windows and dust track-in by humans and pets. At OU4, despite the fact that temporary sediment basins at and below the tailings pile/repository and drainage improvements have been established, a large volume of tailings and mine waste is already present in downstream locations from years of erosion. Precipitation flowing across the site results in ongoing erosion, all of which is not fully controlled by the current containment and drainage structures. Engineering components includes establishing clean drainage courses around the perimeter of the tailings impoundment, constructing additional sediment and seep collection basins, downstream removal and/or containment of existing sediment and wastes necessary to control continued downstream migration and impacts.

Are the contaminants contained in engineered structure(s) that currently prevents migration of contaminants? Is this structure sound and likely to maintain its integrity?

Partial containment has been achieved at the tailings impoundment through maintenance grading and construction of three temporary sediment basins. However, engineering improvements are necessary to ensure the integrity and long-term capacity of these structures for an extended duration is adequate. Suspended tailings and sediment discharges from the sediment basin outflows during excessive precipitation runoff events. Contamination downstream of sediment basins is not contained and continues to migrate. Rapid and excessive erosion during large precipitation runoff events, both at and below the tailings/repository location, results in transport of mine waste and contaminated soil presenting costly ongoing maintenance issues.

Are the contaminants in a physical form that limits the potential to migrate from the site? Is this physical condition reversible or permanent?

The majority of contaminants in the mine waste pile are prevented from migrating from the site with proper engineering controls in place. Historic eroded mine wastes down gradient of the mine waste pile are not contained. Current physical conditions, both on and off site, are reversible.

Are there institutional physical controls that currently prevent exposure to contamination? How reliable is it estimated to be?

No

OU3 - Madison County is a Class 3 county with limited taxation and code/zoning enforcement capability under Missouri Law. In conjunction with health education the development, implementation and evaluation of the VICPP will determine needs for additional ICs if deemed ineffective as a stand-alone IC by indicators monitored.

OU4 - Environmental covenant(s) with property owner(s) will act as institutional controls to prevent activities resulting in future on-site exposure (i.e. damage to cap, drilling wells, etc.). A security gate is in place at the entrance to the tailings pile along Madison County Road 200, but access can be gained to the property from other directions. Reliability of physical controls is low, both on and off site.

Other information on site/contaminant stability?

Contamination in the form of fugitive tailings, impacted sediment and soils in downstream locations continues to erode and migrate during heavy precipitation and flood events posing potential risks to residential properties in the watershed.

Site/Project Name:	Madison County Mines – OU3 Residential Soils & OU4 Conrad Tailings

Criteria #3 – CONTAMINANT CHARACTERISTICS (Weight Factor = 5)

(Concentration, toxicity, and volume or area contaminated above health based levels)

List Principle Contaminants (Please provide average and high concentrations.):

(Provide upper end concentration (e.g. 95% upper confidence level for the mean, as is used in a risk assessment,

or maximum value [assuming it is not a true outlier], along with a measure of how values are distributed {e.g. standard deviation} or a central tendency values [e.g., average].)

Contaminant	***Media**	****Concentrations (expressed in mg/kg)**
Pb (OU4)	Tailings	1,739 (mean) - 3,990 (high)
Cd (OU4)	Tailings	5.6 (mean) - 16.8 (high)
Pb (OU3)	SL	4,212 (mean) – 12,000 (high)
Cd (OU3)	SL	3.4 (mean) - 7.9 (high)

*(*Media: AR – Air, SL – Soil, ST – Sediment, GW – Groundwater, SW – Surface Water)*

*(**Concentrations: Provide concentration measure used in the risk assessment and Record of Decision as the basis for the remedy.)*

Describe the characteristics of the contaminant with regards to its inherent toxicity and the significance of the concentrations and amount of the contaminant to site risk. *(Please include the clean up level of the contaminants discussed.)*

The toxicity of Lead and Cadmium presents risks to humans by inhibiting natural growth and neurological development. Toxicity to ecological systems may be carried in the food chain which will result in bio-accumulation to any affected species.

Describe any additional information on contaminant concentrations which could provide a better context for the distribution, amount, and/or extent of site contamination. *(e.g. frequency of detection/outlier concentrations, exposure point concentrations, maximum or average concentration values, etc.....)*

Several locations possess varying concentrations of the primary contaminants. Exposure points could virtually exist at any residential property and locations where source materials are present which includes the mine waste locations and impacted locations where materials are transported or migration occurs.

Other information on contaminant characteristics?

Site/Project Name:	Madison County Mines – OU3 Residential Soils & OU4 Conrad Tailings

Criteria #4 – THREAT TO SIGNIFICANT ENVIRONMENT (Weight Factor = 3)

(Endangered species or their critical habitats, sensitive environmental areas.)

Describe any observed or predicted adverse impacts on ecological receptors including their ecological significance, the likelihood of impacts occurring, and the estimated size of impacted area:

Ecological risk was not studied for the OU3 interim actions. No endangered species or their critical habitats or sensitive environmental areas have been identified at residential properties or at the tailings/repository location. However, the fat pocketbook muscle is a protected species in Missouri and has been identified as present in Madison County in the Little St. Francis River (LSFR) Watershed.. Terrestrial vermine and other aquatic life were identified at risk in the eco-risk assessment. The OU3 project area covers Madison County in its entirety, extending into southern St. Francois County with an estimate of 300 residential properties remaining to be remediated. OU4 project area is approximately 28 acres with approximately two miles of unnamed stream channel possessing over bank deposits and contaminated floodplains to the confluence of Mill Creek. Contamination of Mill Creek and the LSFR Watershed will be addressed under future response actions under OU7.

Would natural recovery occur if no action was taken? ☐ Yes x No
If yes, estimate how long this would take.

Lead in residential soil would remain a subject of human exposure and will not naturally recover. Mine waste would continue to erode and migrate downstream into the foreseeable future resulting in no natural recovery in any projectable time period.

Other information on threat to significant environment?

N/A

Site/Project Name:	Madison County Mines – OU3 Residential Soils & OU4 Conrad Tailings

Criteria #5 – PROGRAMMATIC CONSIDERATIONS (Weight Factor = 4)

(Innovative technologies, state/community acceptance, environmental justice, redevelopment, construction completion, economic redevelopment.)

Describe the degree to which the community accepts the response action.

The community has been generally receptive of the RA at the site, however the they are anxious and becoming less patience as the actions slowly proceed to completion. Response actions at residential properties has been ongoing for nearly 13 years, and such actions are extremely disruptive both to the residents whose properties are being remediated and those living along the haul routes and near the repository where hundreds of dump trucks pass on a weekly basis. Completing the final construction under the OU3 IROD at the remaining residential properties is the most difficult, particularly considering those who are most unwilling to cooperate own the properties that have not been remediated. Exemption 5: DP

Describe the degree to which the State accepts the response action.

The state has concurred with the selected remedial alternatives in the OU3 IRODs and OU4 ROD. A State Superfund Contract has been executed for OU3, and is willing proceed with a SSC for OU4 currently being drafted. The State provided for the design of OU4 using in-kind services through a Cost Share Cooperative Agreement to be extended through Oct 2015. Additional in-kind services are being considered as an efficient way for the State to not only meet their cost share, but effectively assist in the response actions. The State has accepted O&M responsibilities upon

construction completion through their concurrence of the OU3 IROD and OU4 ROD.
Describe other programmatic considerations, e.g.; natural resource damage claim pending, Brownfields site, use of innovative technology, construction completion, economic redevelopment, environmental justice, etc…
The State of Missouri in conjunction with the U.S. Fish and Wildlife Service is pursuing NRDA claims in Madison County and recently held a public meeting to present its findings. EPA is pre-disposed to complete the remedial actions necessary to ensure the stability and containment of the repository, particularly since it was EPA's decision to place and store soils from residential properties. The actions to be taken at the repository are planned to be jointly completed with the residential soils clean up under OU3. Residences affected in the OU4 project area are being postponed for remediation until the other residences and OU4 is near c because of the likelihood cross-contamination would occur.. The use of existing and creation of new wetland areas will result in the preservation of the natural ecological systems with as little damage to wildlife habitat as possible.